

COAL

MILLING

JANUARY 1949

VOLUME XXVI, No. 1



ARKWRIGHT MINE MOUTH

(SEE STORY INSIDE)

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Annual Savings:
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Yearly fuel costs for a Cummins-powered earth mover on a multi-million-yard earth-moving project are \$1138.80 less than the fuel costs for an earth mover powered by another make of diesel and doing similar work. That's because the Cummins-powered unit, while making more trips and carrying heavier loads, uses only 25.7 gallons of fuel per shift against 33.5 gallons per shift for the other diesel.

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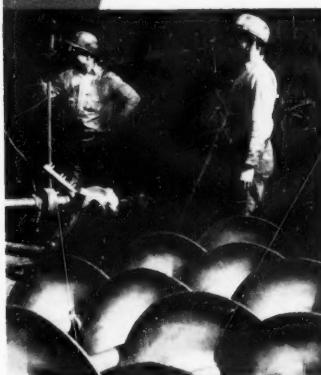
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A close-up view of the drill head. The spiral operation of the auger conveys the coal from the working. A portable conveyor may be used to load coal into a truck as it is drilled from the seam.

The McCarthy coal drill provides a new method of mining extra tonnage from workings where overburden expense prevents further stripping. With augers of 12, 16, 20, 24 and 30-inch diameters, and where overburden is firm, as much as 75% of the coal can be removed to any reasonable depth. And coal taken from the heart of the seam by this method is clean and dirt-free.

The new McCarthy coal drill provides an inexpensive method of mining coal that previously was considered a loss . . . will add an extra "bonus" to your coal mining operations. Write or phone today for complete information on this time-saving, "extra tonnage" coal drill.

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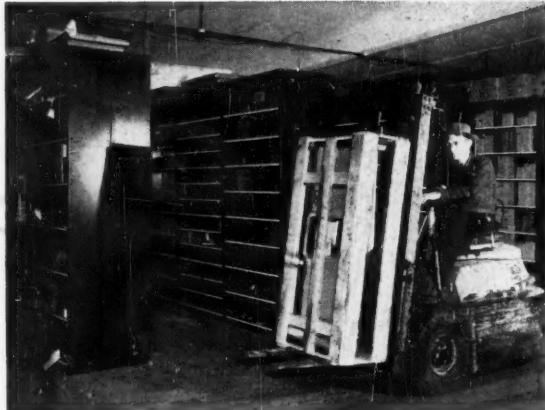
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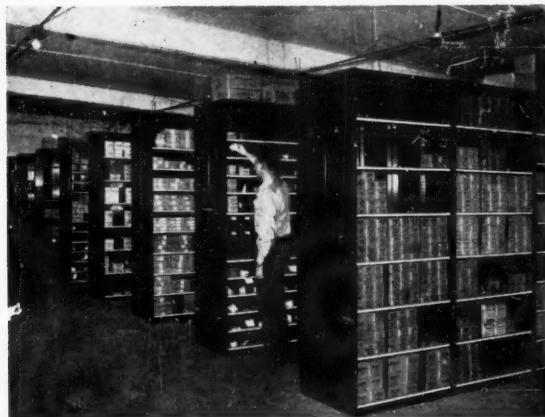
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We can put Our finger
on Your preparation
problems



FAIRMONT plants are preparing over 35,000-ton
size and blend coal for every year. They clean,
such proved acceptance is your guarantee of satis-
faction. Chances are, we have worked on many
preparation problems similar to yours—and have
built the plants which are now paying dividends
in meeting market requirements with low operat-
ing and maintenance costs.

When it's preparation
call a FAIRMONT engineer

FAIRMONT MACHINERY COMPANY
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Designers & Constructors of Chance Sand Flotation Process for Wet Cleaning & American Pneumatic Separator for Dry Cleaning

COAL MINING

VOL. XXVI

JANUARY, 1949

No. 1

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With or Without
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Write for descriptive literature or ask your dealer.

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INCORPORATED
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EUCLID PAY DIRT



Piles Up
Profits
for Owners

Bottom-Dump Euclid Coal Hauler being loaded with 40 tons of coal at an open pit mine of Cent. I Ohio Coal Company.



15-ton Rear-Dump Euclid Coal Hauler being loaded by a 7½ cu. yd. shovel at Georgetown Mine of Hanna Coal Co. in southern Ohio.



Model LD Rear-Dump Euclid dumps 30 tons of heavy overburden on a waste bank in the anthracite field. Owner: Dick Construction Co., Inc., of Hazleton, Pa.

On job after job, Euclid equipment is stepping up production...moving big yardages of material at less cost per ton or yard. Because they are designed and built throughout for the heavy service of off-the-highway hauling, Euclids actually cost less to own than ordinary hauling equipment.

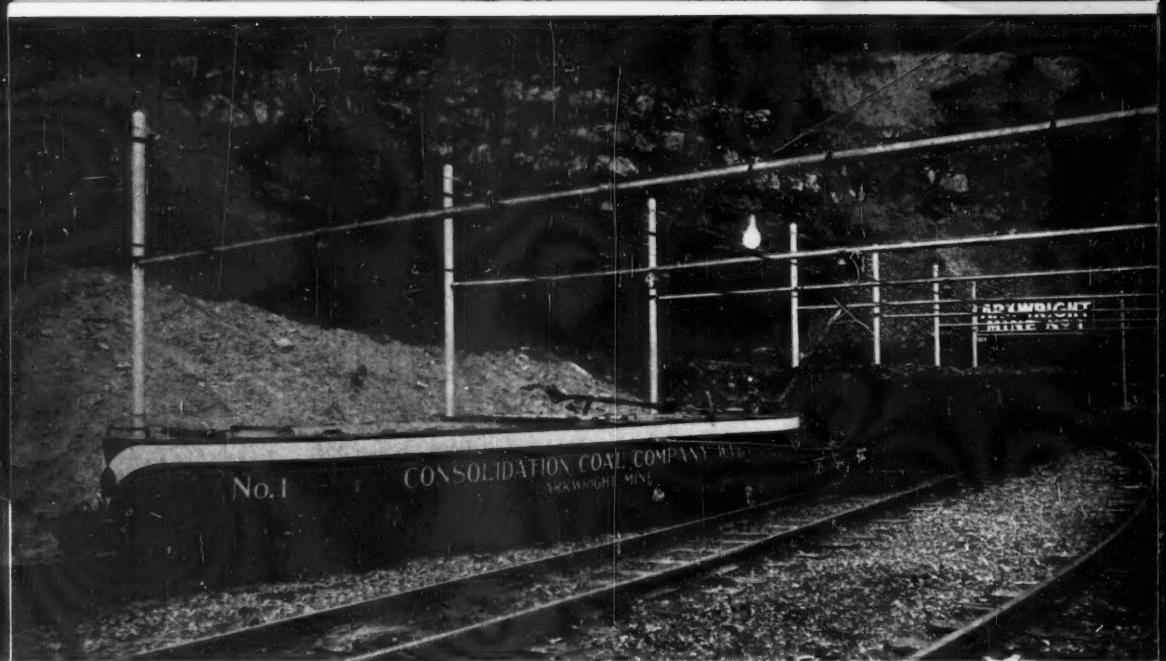
Ability of "Eucs" to stay on the job day after day under a wide range of operating conditions means more yards moved more profitably. Large capacity, speed on the haul road, ample power for steep grades and tough hauls...these are some of the Euclid features that get jobs done on time and at a profit.

Ask your Euclid distributor for a recommendation based on practical applications of Euclids on work similar to yours and for proof that there's more pay in every Euclid payload.

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DIFFERENTIAL HIGH SPEED LOCOMOTIVES With 8 Wheel Large Capacity Mine Cars FORM A WINNING COMBINATION



Differential Man Trip Cars

for a safe, speedy, and
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Pioneer Builders of Haulage Equipment
Since 1915

DIFFERENTIAL SUPPLY CARS

for economical, safe and easy
handling of

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MISCELLANEOUS MINE SUPPLIES



DO YOU KNOW

A dog's life for the dog-days: loaf all morning, take an afternoon siesta under the porch, have dinner at eight. This program has the joint recommendation of the American Veterinary Medical Association.

Further recommendations: Don't subject pets to strenuous exercise during the heat of the day. Don't expect animals to have hearty appetites in hot weather. See that they have clean, fresh water at all times. Give them, for their one daily meal, a ration with adequate amounts of animal protein, vitamins and minerals, including salt.

* * *

A used handkerchief can unleash a bombardment of 136,000 germ particles, according to a group of British scientists. Even more alarming was the discovery that common aerial disinfectants do not kill these germs.

* * *

War can be avoided and peace maintained by using the methods and knowledge of science. That is the belief of those who have been working on the problem.

"War is not born in men; it is built into men." Two thousand American psychologists in 1945 agreed that "no race, nation or social group is inevitably warlike."

An international group of social scientists summoned this year by UNESCO put it this way:

"There is no evidence to indicate that wars are necessary and inevitable consequences of 'human nature' as such. The problem of peace is the problem of keeping group and national tensions and aggressions within manageable proportions and of directing them to ends that are at the same time personally and socially constructive so that man will no longer seek to exploit man."

Scientists in arguing the usefulness of science in maintaining the peace are not suggesting that they should take over the day-by-day international relations job from the diplomats or that they should replace the military commanders. They do believe that they can and do help both the diplomats and the military in very practical ways so far as they are allowed.

Science and technology constitute the one field of human endeavor that is most truly international. They provide bridges between peoples, nations and ideologies that art, music, religion and business cannot furnish.

* * *

Two American gas turbine engines are now to be used in this country in conducting two notable experiments in the coal-burning field. The first is in connection with the use of pulverized coal as a fuel for gas turbine locomotives. The second is in the use of gases for fuel which are obtained by burning underground thin layers of coal just as they occur in nature. The gas turbine engine, now becoming more popular in America and other countries because of its efficiency, is similar to the steam turbine but utilizes gases of combustion under high pressure against the vanes of the shaft of the engine to cause its rotation. High-pressure steam is used in the steam turbine. One great advantage of the gas turbine is that it replaces locomotives.

HERE AND THERE IN THE COAL INDUSTRY

The President of the University of Kentucky has captioned his annual report to the Board of Trustees: "1948—The Great Year." In a section of the report dealing with the College of Engineering, a paragraph referring to scholarships says:

"Along with the Princess Elkhorn Coal Company's annual two four-year scholarships, the Ashland Oil and Refining Company Scholarship, the Harry E. Bullock, Jr. Award, and the Inland Steel Company scholarships, there was established during the past year an Annual Graduate Fellowship Fund of \$2500 in Mining Engineering by the Consolidation Coal Company (Ky.) and two four-year scholarships each year for students in Mining Engineering by the Harlan County Mining Institute."



At the Nineteenth Annual Meeting of the Illinois Coal Operators Association, held in Chicago on December 16, the following were elected as members of the Executive Board: J. Roy Browning, D. W. Buchanan, D. H. Devonald, Geo. B. Harrington, Hubert E. Howard, E. R. Keeler, T. C. Mullins, T. J. Thomas, A. H. Truax, and Wm. P. Young. Officers of the Association for the coming year are: Geo. F. Campbell, President; J. Roy Browning, Vice President and Labor Commissioner; Fred S. Wilkey, Secretary; Thurlow G. Essington, General Counsel, and C. W. Peterson, Treasurer.



Mr. B. W. Whitfield, Sr., eighty-six years of age, passed away at Harlan, Kentucky.

He developed the Clover Fork Coal Mine, the Harlan Collieries Company, the Bell Coal Company and the Kentucky Jellico Coal Company. Mr. Whitfield was very influential in organizing the Harlan County Coal Operators Association and served as its Vice President for a number of years. He worked diligently in the establishment of Appalachian Coals, Incorporated.



Harry W. Payne of McComas, W. Va., formerly General Superintendent of the American Coal Company of Allegany County, has been elected General Manager, succeeding Henry F. Warden, now President.

Cheaper gasoline and fuel oil from coal is promised by improved processes under development at the U. S. Bureau of Mines experimental and research laboratories in Bruceton, near here.

In these laboratories, a basically new approach to the problem of synthetic liquid fuel production by direct hydrogenation of coal is under investigation, the American Chemical Society was told by Dr. Henry H. Storch, chief of research at the institution. The method, he said, is a departure from the conventional Bergius process used by the Germans.

In this German process, coal dust is mixed with oil to form a paste. This is then treated with hot hydrogen under a pressure of more than 2,000 pounds per square inch. In the new process, Bureau chemists are trying to achieve better results by using moderate pressures and relatively high temperatures. Under these conditions considerable coal is turned to coke, but the coke can be recovered and used to furnish heat for the process.

In the new developments, relatively inexpensive water gas may replace the expensive hydrogen. The cost of compressed hydrogen constitutes about 50% of the total cost of liquid fuels prepared by hydrogenation of coal, he stated. Water gas, made by passing steam over white-hot coke, is the common manufactured gas used in many cities where natural gas is not available.

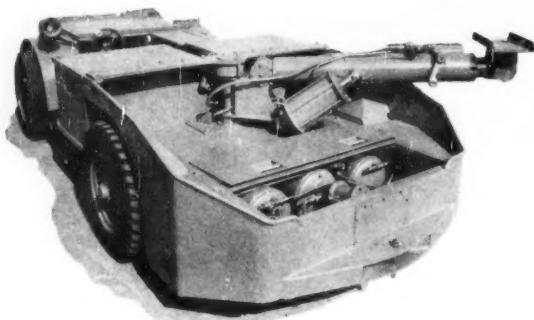
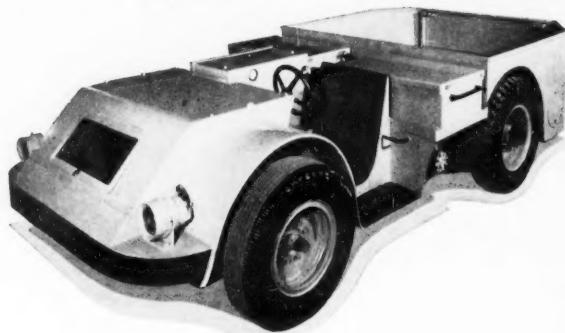
Laboratory experiments have disclosed that under appropriate operating conditions it is possible to replace pure hydrogen with the water gas, which is itself a mixture of hydrogen and carbon monoxide. Similarly, it is also possible to substitute for pure hydrogen the light, gaseous by-products of the hydrogenation process. Coal itself contains some available hydrogen which can be exploited by converting the coal to coke.

An entirely different process is also under study. In this the coal is dissolved before being treated with hydrogen. Research is now directed at determining the best solvent, and also at discovering suitable catalysts to speed the hydrogenation action under these conditions. This process is carried out at relatively low temperatures and pressures.

NOW—THE RJI “MINE JEEP”

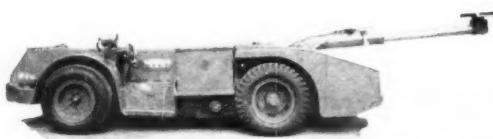
is fully equipped for 5 Complete Operations!

Here is the
all round service
unit for your
trackless mining
systems



TIMBER BOOM

Telescoping timber mounted on rear platform.
Operated by two air lifting cylinders
Self leveling timber head
Swing 55° to each side of center
Hand swing with automatic air brake stop
Hand operated telescoping and 36" extension



Please write for bulletin
and complete information.

1 UTILITY TRUCK

For handling supply and materials
needed for operating and maintenance crew.

2 MINE TRACTOR

For pulling rubber tired trailers, with timber and other supply, also to pull miscellaneous equipment such as rock dusters, air compressor units, etc.

3 GREASE & SERVICE UNIT

Fully equipped with air operated oil and grease guns for complete lubrication of mining machinery at the working face.

4 TIMBERING MACHINE

Equipped with air operated timbering boom and power driven timber saw.

5 POST PULLER

Four speed transmission gives power and speed for pulling post. Can also be equipped with electric driven winch.

GENERAL DIMENSIONS

Overall height	36"
Overall width	76"
Overall length	14'-7"
Wheel base	80"
Timber boom-Max. height	8'-6"
Timber boom-Max. Swing	55° each side of center

Lee-Norse Company
CHARLEROI, PA.



Main Mine Office Building, shaft and shaft head house at the Arkwright Mine. In this building are the offices of the Superintendent, Foremen, Chief Clerk and his Secretary, Engineering and Drafting Department, Lamp House, Locker Room, Showers, Replacement Parts Storage and Hospital.

CHRISTOPHER COAL COMPANY'S ARKWRIGHT MINE

All our lives and according to history of the preceding century, the world has been in a state of continuous change. In North America a few immigrants, several hundred years ago, have grown to more than 170 million inhabitants. Forests and prairies have been made into agricultural and industrial developments.

A transition from human and animal power to electric power has taken place. We have gone from handicraft and agrarian culture to complex industrialization. As industrialization increases, however, complex problems arise, problems which man has never encountered before.

In order to better enable us to

cope with such problems the College of Engineering, in conjunction with the Institute of Medicine of the College of Medicine, New York University is pioneering an effort in cross-fertilization of ideas from many scientific fields which are concerned with the general problems of inter-

(Continued on page 16)



Office of the Chief Clerk and his Secretary.



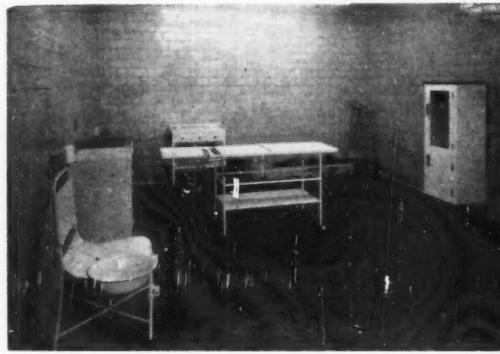
Office of the Superintendent.



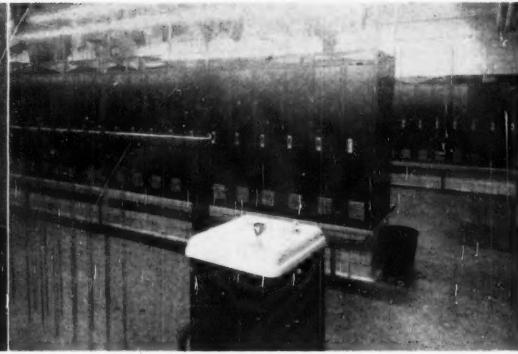
Office of the Mine Foremen.



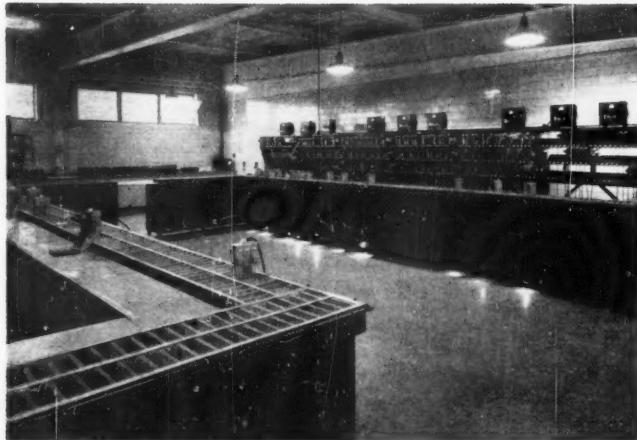
Drafting room in the main office building.



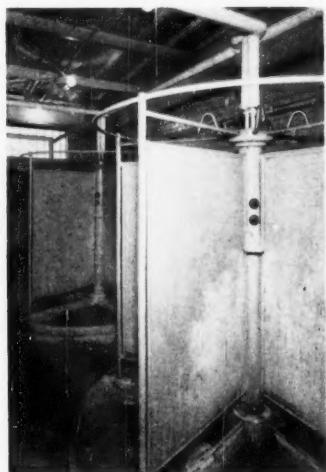
The Mine Emergency Hospital.



Worker clothes locker room. Note ventilating duct on lockers. Exhaust fan draws air through the locker to the outside. There is no odor in the room. Heat comes through the concrete floor.



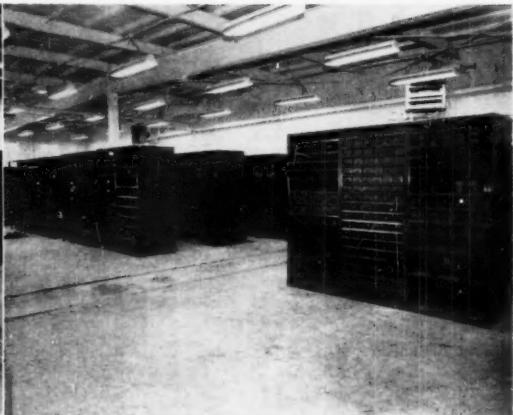
The miners lamp house that surpasses any ever built.



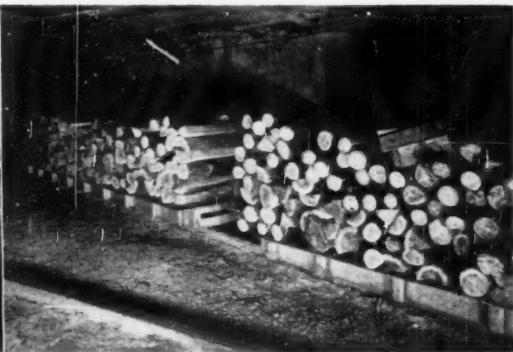
Shower room in the workers quarters.



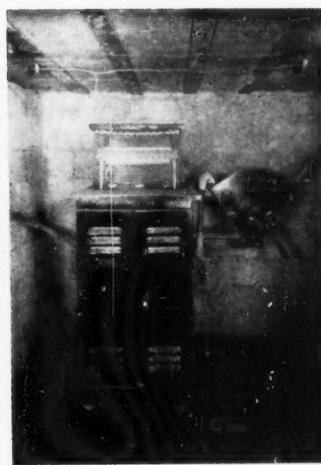
Two views of storage bins in the replacement parts storage room.



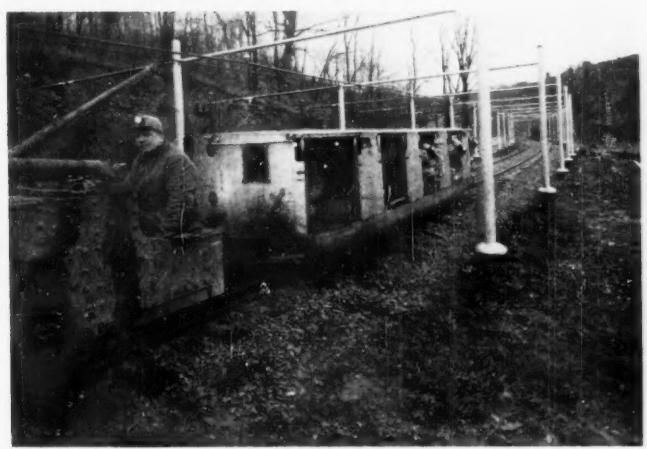
Steel "H" beams are used to arch timber bad spots in roof on main haulroad.



Flat cars are used to haul timber and other mine supplies.



One of the Automatic Reclosing Circuit Breakers that are used through the mine.



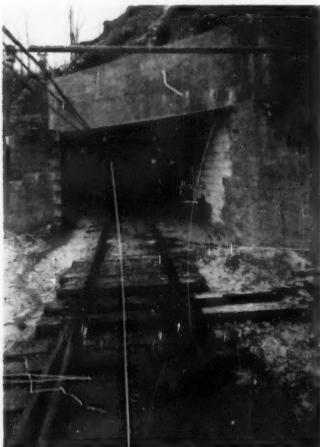
Steel mantrip cars are used for transporting workers to the face.



Some of the improved outside track



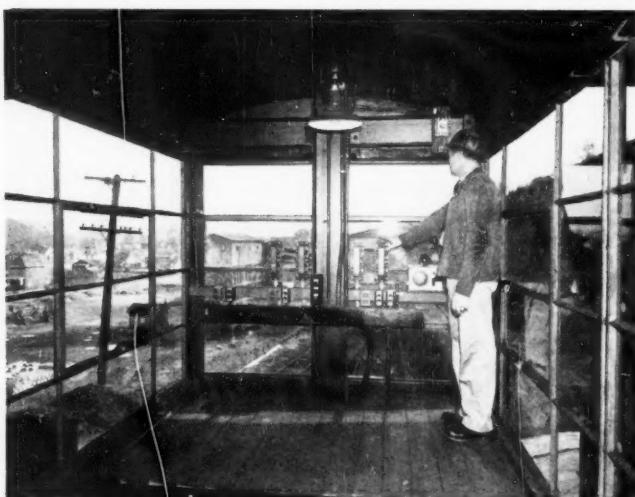
Loaded 8-wheel-all steel mine cars at the end of their trip to the cleaning plant. Part of the new 60-inch refuse belt conveyor can be seen in the background.



Concrete work on main haulage road running through hill to the cleaning plant.



Close up of the Mine Mouth, showing the traffic signal blocks that are being installed.



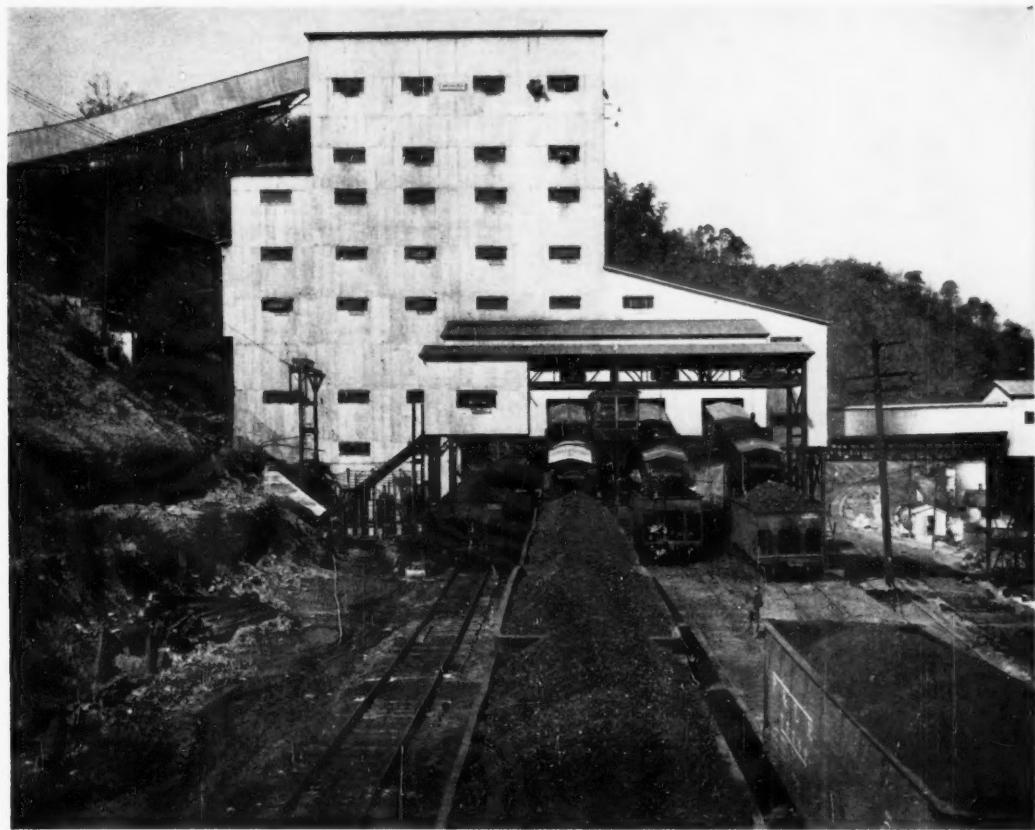
Control tower at the cleaning plant.

(Continued from page 13) actions of men and machines. This effort is being called Human Engineering. Experimental techniques and data of engineering, the biological, medical, the psychological and certain other social sciences, notably anthropological, all of which are concerned with conditions under which man works and the factors associated with optimal performance of machines are being drawn upon heavily.

Sessions of the Human Engineering Seminar have attracted representatives from virtually all of the professions whose mutual interests find expression in this work. Some major problems of human engineering have begun to emerge and to clarify themselves. There is a growing acceptance among participants of the need to fashion practical working procedures for team approach to the resolution of pressing research prob-



Overall view of the cleaning plant and belt conveyor to the River. The coal testing laboratory is being built beyond the loaded railroad cars.



Side view of cleaning plant, showing railroad car loading booms.



Some of the conveyors in the cleaning plant.

lems from many sciences which find concrete expression in this field.

Among papers presented before the Seminar was one on "The Present Status of Fatigue." There was an effort to understand problems of fatigue within the context of motivation as a psychological process. "An Over-All View of personality for Human Engineering" sought to advance the motive notion that in human engineering research, man has for too long been considered a machine or machinelike and that it is time to concern ourselves with attitudes, motivations and other personality characteristics and processes of men in relation to design and operation of machines.

Other papers "The Present Status of Principles of Motion Economy," and "Anthropometric Data in Design and Operation of Machines and Equipment" highlight interests of members of the Seminar.

Sometime in the future we will

have more concrete information about reactions of men to machines. In the meantime, the Christopher Coal Company, Subsidiary, Pittsburgh Consolidation Coal Company, (W. Va.), W. L. Doolittle, President, C. R. Nailer, Vice President, and Frank Brooks, Superintendent, is applying its present best knowledge of Human Engineering to the coal mining industry at its Arkwright Mine at Granville, West Virginia.

From the standpoint of mining coal, the top office building and the shaft head house of this mine are so far ahead of anything in the industry that they are simply out of this world.

The main entrance and supplies shaft of the Arkwright mine is located 6 miles from the head house of the preparation plant on the Monongahela River. Coal is being produced from the Pittsburgh seam which averages 6½ feet thick at that

location. Production equipment consists of cutting, drilling, loading machines and shuttle cars of the latest type.

Considerable grading has recently been done on the main haul roads. Heavy (85 pound) track has been laid on ballasted roadbed. Gunning has been started to stop spalling. Bad roof had been taken down and the areas are arched with welded steel H beams. An electrical signalling system is being installed.

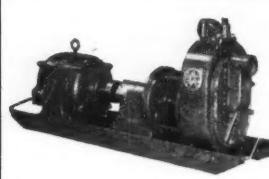
The transportation equipment consists of large 8 wheel all-steel mine cars and 26 ton streamlined locomotives, built by the Differential Steel Car Company. Timbers and supplies are hauled in flat bottom cars. Men are transported to working places in Differential all steel mantrip cars. Main line locomotives are being equipped with Farmco Trolley Phones. A modern underground machine shop is being built. At the head house, loaded mine cars are dumped by a Link-Belt rotary dump and the raw coal goes to a 2,700 ton concrete silo type storage bin. The raw coal is then fed from the bin into a Fairmont Machinery Company built Chance Sand Flotation Cone for cleaning.

A new folder entitled "Hot News for Cold Engines" has been released by the distributors of California Oil Company Products for their "Chevron Starting Fluid." The folder describes how starting fluid gives quick starts to Diesel and gasoline power units under cold weather conditions.

This new folder is available from Gordon Lubricating Company.

* * *

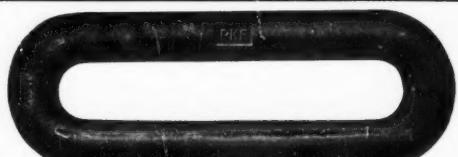
New literature covering 6 ton MH 88 locomotive resistors, Choke Resistances, W-180 Bond Welders and BW-200 Bond Welders has just been released by the Electric Manufacturing Company, Inc., West 16th and Virginia Ave., Huntingdon, W. Va.



**MARLOW
SELF-PRIMING
CENTRIFUGAL
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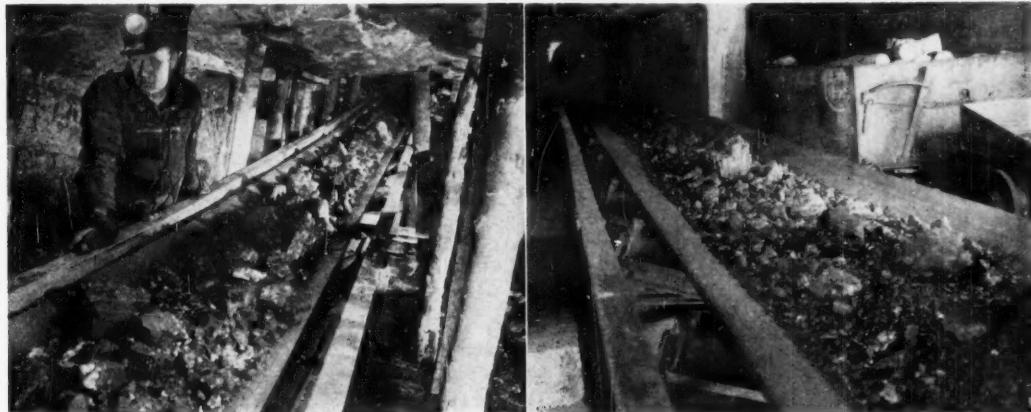
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Photos Courtesy Hewitt Rubber Co. of Pittsburgh

Belt Conveyors in two West Virginia Mines.

Conveyor Belt Fires In Bituminous Coal Mines

By JOHN H. HANSFORD

*Director, Mine Rescue and Safety
West Virginia Department of Mines*

This paper is prepared solely from experience in connection with belt fires within the State of West Virginia and no attempt is being made to dictate methods and procedures to be used by operating companies or enforcing agencies in other parts of the country. It is hoped, however, that when designing and maintaining belt-operated mines you will be able to profit from our experiences, both good and bad.

In the past year and a half, West Virginia has suffered eight fires in belt operated mines. Five of these fires had their origin in connection with the operation of the conveyor unit as a whole, or in the electrical circuits of the belt driving machinery, and three were caused by friction on the belt itself. The friction, in each case, was the result of a stuck roller or a slipping drive pulley.

Let us first consider the fires occurring as the result of cable failure or insulation break-down. In every instance, from investigation, it appeared that the circuit, wherein the failure occurred, was not properly protected against overload or, if it was properly protected from an installation standpoint, the protective elements were made inactive by improper maintenance. Consequently, when the circuit was subjected to an overload the cables and drive motors "just took it," so to speak, until the weakest point finally gave way.

A fire resulting from an over-loaded conductor kindles rapidly because, by the time of the ultimate failure, the windings of the motors and the copper of the cables are pre-heated to a high temperature. The surrounding debris, and there usually is some coal dust and oil drippings, is just waiting for the flame.

I shall briefly describe the findings in connection with the belt fires resulting from electrical sources:

Case I: The fire originated between shifts and was discovered by the fire boss. The location was deep in the mine near a partially pillared area where gas may have accumulated. The belt was cut but, due to the intensity of the fire and the system of mining, several days and nights of dangerous work were performed without bettering the condition and, had not a major fall occurred on what remained of the burning belt, it is doubtful if the fire could have been contained and stopped from spreading to the old works with the consequent sealing of a large area and a major loss of machinery. During the fire, two men barely escaped with their lives. A short circuit in the power cables alongside the belt was the fire's origin but the cause of the short circuit was definitely determined.

Case II: The fire originated at night, in a structure outside the mine

which housed the driving machinery for the main belt. The fire spread to the belt and continued inside the mine for approximately two hundred feet, until extinguished. The exact point of the ignition was not determined, due to excessive damage. However, after investigation the conclusion was that the fires origin was electrical and due to an overload. Material in the structure was ignited with a major fire as the result.

Case III: The fire originated at a driving head inside the mine and was the result of cable failure. The cable was underneath gob and coal at the time of the failure and this material was ignited, the flame spreading to the belt. There appeared no reason for the cable failure, other than overload or overload plus a bad splice. The fire was contained and extinguished in twelve hours with a minimum of loss.

Case IV: In this instance, an accumulation of dust and coal at the tail piece fouled the belt and tail pulley and caused such an overload on the drive motor that an insulation failure, due to the excessive overload, finally occurred. The resulting fire spread to the belt but was luckily discovered before a large area was involved and was contained and extinguished within fourteen hours.

Case V: The fire originated at a face junction box and along a power

cable supplying the conveyor unit and was the result of a short circuit in the junction box. Overload protection, a 1000 Amp. circuit breaker which obviously was set too high, was provided outby the junction box but was not effective. Part of the circuit in by the breaker was No. 00 insulated cable and it was connected to approximately 350 feet of No. 4-3 conductor cable; the junction box being at the end of the No. 4-3 conductor.

When the short circuit occurred and did not burn free, the entire length of the No. 4 cable became red hot and set fire to everything it touched which was inflammable. Presumably, the greater current capacity of the No. 00 cable did not allow it to heat sufficiently to kindle or the fire would have immediately involved the entire length of the extension, some 1300 or more feet. The fire occurred on an off-shift and was discovered by a fire boss only after extensive damage to a secondary belt servicing three units in the immediate vicinity. The fire was contained on the second day, but several more days were required to extinguish it and load out the debris.

You will note that, while the ignitions in these foregoing instances were of an electrical origin, they probably could have been prevented through proper overload protection maintained in a workable manner. The fact that poor housekeeping, in the way of allowing combustible material to remain in close proximity to the motors, cables and belts, contributed to the generally unsatisfactory manner in which the units were maintained, it could not be described as a cause. It was, however, a ready and able assistant once the ignition occurred. It is obvious that, in at least one instance, there was gross neglect in not maintaining the conveyor and conveyor structure free of accumulations of coal dust.

We will now consider the belt fires which were the result of mechanical difficulties. In the first instance, we have a belt head fire as the result of the drive pulley slipping. There were two possible causes: one that the belt was just carrying too much load and the other the failure to properly tighten the belt after splicing to insure proper friction. The second assumption appears most logical as it was found that, at the end of the preceding shift, the belt had been spliced but had not been run under normal load, due to the ending of the shift. The fire occurred at about the time the second or oncoming shift began

to function at its maximum efficiency, which gave credit to the assumption that, after the splice was made, the belt takeups were not positioned to insure the proper friction necessary to propel the usual load.

Belts in this mine had been spliced on other occasions and had been closely observed for slippage and tracking while being "run in." The fact that there was a shift change at the time the belt was spliced should not have changed this procedure. Had the night shift been instructed to look out for the usual difficulties which are always encountered when a belt splice is made, they would have observed the belt slipping and avoided the fire.

The cause, however, of the belt stoppage was entirely different and was the result of negligence. Coal around the tail pulley finally packed to such an extent that the belt and pulley could not turn.

The third instance is essentially the same as the second. After starting the belt, the employees later discovered the belt on fire at the driving head, due to drive slippage. The belt had fouled as the result of improper maintenance.

Of the eight fires, of which I have given you a short description, seven varied from serious to critical situations, with one near catastrophe. In all but one of the fires, men had to be removed from the mines under varying conditions, none of which were favorable. Crawling can never be called a favorable way to escape an impending disaster inside a mine, even if you should have a good crawl-way, and very few belt operations maintain track for supplying or travel.

In all instances, there was damage to the belt installation and mine generally and, in every instance, the mine was idle from two days to several weeks, resulting in great expense.

The methods of fighting these fires followed one general pattern which, in turn was necessitated by the physical condition of the area and the material at hand. This method was, if possible, to get on top of the fire with rock dust or rock dust plus water, if the latter was available, and always the rock dust had to be transported the "hard way" through areas where a man could not walk.

In view of the fact that the belts are very flammable and the trough, with its rollers full of grease, can be compared to an oversized blow torch if the ventilating current is strong, it is readily seen that time is the all

important factor once an ignition occurs. In most of these fires, the time element was realized and while the fire fighting material, that is the rock dust, was available in only small amounts, it was utilized to the fullest extent and did slow down the fires until help arrived. The West Virginia Department of Mines has long advocated that supplies of rock dust be stored at strategic places inside the mines and, at some of these fires, the precaution paid off.

It is worthy of note that, in all but one instance, the fires occurred in the vicinity of the belt heads or spill in points. It is imperative then that these vulnerable spots be adequately protected at all times. Ordinarily, in large belt installations, a maintenance man or two patrols the belts during the day shift and another checks around, so to speak, during the night but they can do little, other than sound an alarm, if they are a quarter of a mile away when a fire starts. Operators should install automatic fire controls at the drive points and spill ins that would be actuated by heat. You have fuse links that shut your sub-station doors in case of a fire. Why not a similar arrangement to drop rock dust barriers or open sprinklers in and around the belt? Better overload protection, the assurance that the existing protection is in proper working order.

Attention should be called to the unusual incidents in connection with the fires caused by the short circuit in the junction box, as probably nothing exactly like this had been experienced prior to that time. The cable was not insulated with an insulation of special fire-resistant characteristics, the cable being of standard manufacture. The cable, except where coiled, was suspended on the mine timbers by the means of insulators which became so hot, as a result of the short circuit, that the insulators, with probably some assistance from the burning insulation, set fire to many of the posts from which it was suspended and, wherever the cable crossed the belt line, the belt was thought to have been ignited by the fiery drippings. As a result of these unusual occurrences, several fires at various points were started simultaneously. Fortunately, this occurred along a secondary belt but imagine such a fire on your main belt.

In discussing these fires, I have used the word "contain." I have done it purposely, for a belt fire must be contained to be fought. You cannot overtake a belt fire if it has a start. Our most disastrous fire could not be

contained and was extinguished only after large falls, occurring as a result of the conflagration, actually stopped the fire from further travel and the area cooled sufficiently to allow the fighters to load out the debris.

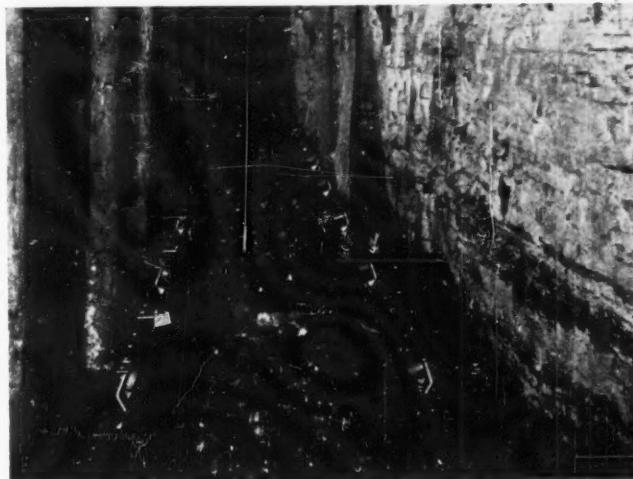
A belt fire burns rapidly in both directions from the source of ignition, once the fire really gets under way. A person approaching must travel the intake airway, whether under oxygen or not, as the heat and smoke prevents his approach on the return. He immediately cuts the belts and prevents the fires spread in the direction from which he has approached and starts fighting the fire, but what of the other end? Offhand, we will say "Let's get down the back air courses." But, can you always do this? I do not mean that remark solely in the light of poor air course maintenance and two and one-half to three foot coal.

Ventilation must be maintained while the fire is being fought until the men escape so you still have a return somewhere that you must enter if you get around the fire to contain it. Later you may change the air flow to better suit the conditions, but all this requires time and preparation.

As the result of unfortunate occurrences, such as have been enumerated, the West Virginia Department of Mines is giving serious consideration to the future in regard to the approval of the ventilating system of belt operated mines. Engineers submit many plans of operation but not always is the method of ventilation, especially in view of a possible catastrophe, given as much consideration as the arrangements for a smooth flow of coal.

If the haulage belts were installed in a dead entry, that is to say one with only sufficient ventilation for safe operation of the belt and the intakes and returns separated from this entry by incombustible stoppings, would not this be an ideal arrangement? Should a fire occur, it could then be contained immediately by entrance to the belt entry from an unaffected area and be fought from either end. Temporary seals could be placed within the hour to prevent the spread of the fire and assure ample time for escape.

Fires in any mine are bad but in mines operated solely by belts they are extremely hazardous, and we must not overlook any means of prevention, for when men are caught behind a fire, with no means of transportation other than the belt, the situation is at once critical.



Belt conveyor in bad roof area of a Pittsburgh seam mine
South of Pittsburgh, Pennsylvania.

We now have installations whose failure may require over a mile of crawling. Imagine doing this under the best of conditions, much less under the probable necessity of crossing roof falls or water holes. Can these men be reasonably assured of ample time to escape under the present general mining plan, even though promptly notified and the ventilating current as manipulated as to assure fresh air travel for a considerable period? Belt fires are vicious and throw off great quantities of dense smoke and fumes and, as we know, travel fast. Pillars are usually thin and escape could be cut off. I would

feel much better, when a fire did occur, if I knew my belts were already contained and I had only to throw up a quick stopping ahead of and behind the affected area.

Ignitions may not be entirely prevented but they can be held to a minimum by proper maintenance of the belt line itself and the utilization of properly maintained overload protection in the electrical circuits. When an ignition does occur, a catastrophe may be prevented by having your belts all ready to contain, should the self-acting rock dust barriers and sprinklers you have installed at strategic places fail you.

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Mine Examination Questions and Answers

ELECTRICIAN'S EXAMINATION
BITUMINOUS DIVISION
Section 2

June 3, 1948

Q. 11. What hazards are created by the use of electricity in mines?

- A. 11. (60 pts.)
 1. Mine explosions
 2. Mine fires
 3. Electrocutions
 4. Electrical shocks
 5. Electrical burns
 6. Injury to the eyes from electric flashes
 7. Premature firing of explosives by stray currents

Q. 12. (a) What are the essential features to be noted in inspecting electrical installation and equipment?

(b) What action should the mine electrical inspector take if he found serious defects in electrical equipment and what reports shall he make after his inspection?

A. 12. (60 pts.) (a)

1. Competent person should be in charge of electrical equipment, fitted for the position by ability, training and experience. Not to be assigned to other duties; entire time should be spent in looking to safety of electrical installation.

2. A systematic inspection and record of electrical equipment. Inspections to be made according to law.

3. A map or plan should be kept of electrical system.

4. Instructions for resuscitation from electric shock should be posted, (especially in every generating, transforming, and motor room and at the entrance to the mine).

5. All employees (working in connection with electrical apparatus) should be familiar with and know how to carry out these instructions.

6. All persons should be properly instructed in their duties before being allowed to work with electrical equipment.

7. Electrical equipment should not be operated by any unauthorized person.

8. All metallic frames, casings and coverings of all stationary apparatus should be grounded; also metallic sheaths or coverings of cables.

9. Coal cutting machines should be kept in "permissible" flame and explosion proof conditions; thoroughly inspected at regular and frequent intervals.

10. Are the state laws and regulations being complied with insofar as using open type of equipment on intake air only; no trolley wire or feeder cables installed beyond the last cut-through, etc.

11. In inspecting enclosed type or permissible electrical equipment, are the covers of compartments in place

and held down with a full set of bolts with lock washer.

12. Are the flanged surfaces clean and free from burrs so that the covers can be closed tightly.

13. All joints where rigid or flexible conduit leaves the various enclosures should be inspected as to tightness.



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14. Is the trailing cable in a safe operating condition, especially insofar as splices made by the machine operator.

15. Is the machine as well as the trolley tap equipped with the proper fuses.

16. Are there any repairs that need immediate attention with regard to safety.

17. Are the frames of all stationary motors, transformer cases, enclosed metallic switches, metallic sheaths of cables, etc., effectively grounded.

18. All pipe lines paralleling a haulage road should be effectively bonded to the rails of such road at frequent intervals.

19. On all branch circuits where they leave the main circuit there shall be installed a suitable switch for disconnecting purposes.

20. The trolley wire and feeder cables on the haulage roads shall be rigidly installed, with safe clearance as regards both the mine timbers.

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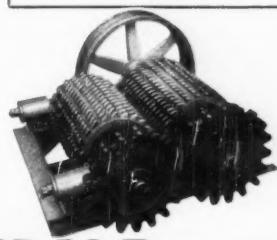
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roof of the heading or mine equipment.

21. At all places where men must regularly pass under the trolley wire, same shall be effectively guarded.

(b) (20 pts.) He should order such equipment out of operation until such defects are corrected.

He shall report all defects found to the mine foreman, and shall make a written report of his inspection in a record book kept at the mine.

Q. 13. What are some of the advantages of alternating current.

A. 13. (30 pts.) Alternating current permits transmission at high

voltages with little line loss and reduction to usable voltages at the point of consumption.

Q. 14. What is the effect upon motors from a drop in voltage?

A. 14 (40 pts.) Inefficient operation, abnormal heating, possible burnouts, and decreased speed.

Q. 15. Name the six fundamentals of first aid, in order of their importance.

A. 15. (40 pts.)

1. Artificial respiration
2. Control of bleeding
3. Shock
4. Open wounds and burns



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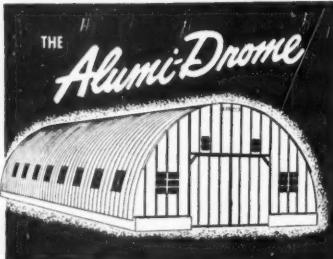
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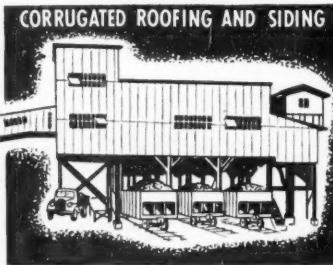
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A. 16. (20 pts.)

$$40 \times 250 \times 100 = 1,000 \text{ kilo-watt hours.}$$

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Q. 17. (a) Where should trolley wire be installed with respect to the rail?

(b) For what purpose is the trolley wire installed outside the rail?

(c) What are the requirements of the law relative to guarding trolley or other bare power wires?

A. 17. (a) (20 pts.) At least 6 inches outside the rail and only on the side of the tracks opposite the clearance side.

(b) (20 pts.) To reduce danger of contact with the locomotive operator, mobile equipment, and persons traveling on a haulageway.

(c) (30 pts.) At all landings and partings or other places where men are required to work or pass under trolley or other bare power wires, which are less than six and one half feet above the top of the rail, a suitable protection shall be provided. This protection shall consist of placing boards along the wire which boards shall not be more than five inches apart, nor less than two inches below the point of the wire; provided, that distance between boards on curves may exceed five inches but shall not exceed eight inches. This does not prohibit the use of other approved devices or methods furnishing equal or better protection. The guarding of trolley and other bare wires as described in the above rule should extend the entire distance of the openings or exposed areas.

Q. 18. (a) Name three hazards arising from the use of acetylene torches in mines.

(b) What precautions should be taken in the use of such torches.

A. 18. (a) (30 pts.) 1. Possibility of the emission of explosive gas into the mine atmosphere.

2. Possibility of fire.
3. Possibility of the cylinder becoming ruptured.

(b) (30 pts.) The use of acetylene torches should be confined to machine shops that are ventilated by a separate current of air which returns directly to the main return air current.

The cylinders should be equipped with metal caps fitted over their main valves while they are being handled or transported.

The cylinders should be transported only in insulated cars or in insulated boxes.

The burning mechanism should not be fitted to the storage cylinder until ready to use.

The following precautions against fires should be taken:

1. The machine to be repaired should be cleaned of oil and grease.

2. Adequate fire protection should be taken such as:

a. An ample supply of rock dust to be immediately available.

b. Fire extinguishers of proper type and ample capacity to be immediately available.

(To be continued)

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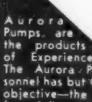
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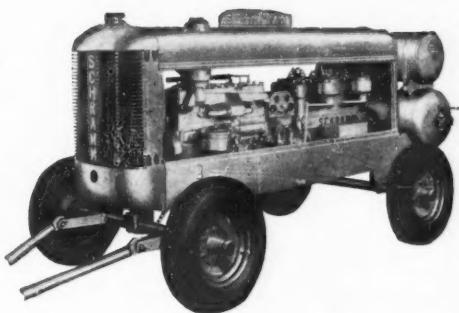
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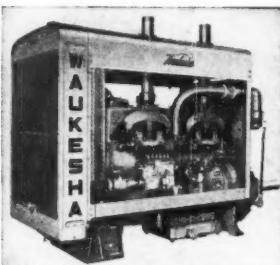
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an efficient, mobile, 105 ft.
compressor with the flexibility
of a 35 hp. wheel tractor —

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**Pulls,
Digs,
Bores,
Loads,
Drills,
Tows,
Climbs,
Plows,
Sweeps.**

The most versatile tool in strip
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REBUILT EQUIPMENT - - - - - READY TO SHIP

SPECIAL BARGAIN

3—Type A3G Goodman Duck bills.
COAL DRILLS
2—Jeffrey—250 v. DC.

COMPRESSORS—SPECIAL BARGAIN

7—240 cfm Westinghouse 3 cyl. vert. 150 lb. pres. dir. con to 50 HP AC Slip ring or DC Motors.

TRANSFORMERS

20—New 25 kva, 450 v. pri. 220/110 v. 1 ph. 60 cy. Allis-Chalmers.

MOTOR GENERATOR SETS

250 v. DC—Motors 220/440 or 2200 v. 3 ph. 60 cy.

No.	KW.	KW.	Make	Speed
1	150	West.	1800	
1	135	G.E.	1200	
1	100	West.	1600	
2	100	Delco	1150	
2	75	West.	720	
1	60	Cr. Wh.	600	
2	60	West.	490	

D.C. Generators—250 v. D.C.

No.	KW.	KW.	Make	Speed
1	250	West.	1200	
1	175	G.E.	700	
3 New	135	G.E.	1150	
1	125	West.	600	
1	125	Allis-Chal.	1150	
1	110	West.	700	
1	100	Allis-Chal.	1150	
1	75	West.	750	
1	40	G.E.	720	

A.C. Generators—220/400/440/220 v.

No.	KW.	KW.	Make	Speed
1	125	West.	250	250
1	450	Elec. Machy.	120	250

Pumps With A.C. or D.C. Motors

Qus.	Gpm.	Head	Kind	Make
3	1200	300	Cent.	Worthington
3	1100	323	Cent.	Worthington
3	1000	336	Cent.	Worthington

D.C. Motors—230 volts

No.	H.P.	Make	RPM	Type
1	175	G.E.	650	MD

SAVE OVER 50% ON NEW BLOWERS AND VENTILATING FANS

AXIAL FLOW VENT. FANS

1—4000 cfm 6x" stat. pres. Sturtevant with 4/1.2 hp., 1750/1150 rpm., 220/240 v. 3 ph. 60 cy.

2—4000 cfm 3" stat. pres. Sturtevant 2 speed AC Motors.

2—5000 cfm 1.8 stat. pres. Sturtevant 220/440 v. AC Motors.

31—6000 cfm Sturtevant Bul. No. 512389, 3" stat. pres., 7 blade dir. con. 5/1.5 hp. 1765/1175 rpm., 220/440 v. AC West. TEFC Motors.

2—6000 cfm Sturtevant 1.65" stat. pres. 220/440 v. AC Motors.

1—7500 cfm Clarage 7½ hp., 220/440 v. 2 speed motor.

2—12000 cfm 3" stat. pres. Sturtevant with dir. con. 10/8 HP. 1775/1180 rpm., 220/440 v. TEFC Motors.

115 VOLT D.C.

8—4000 cfm Sturtevant, 3" stat. pres. West. SK Motors.

4—4000 cfm American Blower, 3" stat. pres.

4/1.7 HP. Motors.

1—3000 cfm Sturtevant, 3" stat. pres.

3/1.25 HP. Motor.

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200—1½ ton Hand Crank rate 27:1 thru an enclosed double reduction gear unit with 4 planetary gears mounted on steel plate complete with 48" of ¼" cable, ratchet type brake, push button release.

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1—315 CFM Ingersoll Rand Portable, 100 lbs. pres. driven by 105 HP Waukesha Oil Engines, 860 rpm.

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100 KW. Diesel Engine Generator Sets

11—100 KW., 250/275 v. D.C. Delco Generators dir. con. to 150 H.P., Model GBD-8, 5½ x 7, 8 cyl. Superior Diesel Engines, electric starting with muffler, power panel and accessories.

Practically as good as new—

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Greensburg Pennsylvania

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Haulage and Gathering Locomotives
20 Ton Jeff. and G.E. 500 v. 42" Ga.
(Can be rewound 250 v.)
12 Ton West. 250 v. 36" Ga.
8 Ton Goodman 500 v. 42" Ga.
8 Ton G.E. 36" Ga.
6 Ton West. 250 v. 36" Ga.
6 Ton West. 250 v. 36" Ga.

STORAGE BATTERY LOCOMOTIVES
6—7 Ton Jeffrey 42" Ga. Ba. Motors.
6 Ton G.E. perm. 36" Ga. HM 826 BB.
5½ Ton Ironton Type A 36" Ga.

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112 EG3 Flameproof AC 220/3/60 6' bar.
Goodman.

112 EG Goodman 230 v. DC 7½" bar.

35 B Jeffrey Perm. 230 v. 7½" bar.

M.C. SETS—ROTARIES (3 ph. 60 cy.)

500 KW. 250 v. West.—714 HP. Syn. 8 P.F.

450 KW. G.E. 250 v.—710 HP. G.E. Syn.

2200 v.

200 KW. 250 v. G.E. 600 Rotary.

300 KW. G.E. Rotary 250 v. with 2-110 KVA

2200/4000 v. Transformers.

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SK 125 v. Gen. dir. con. 450 HP Motor.

100 KW. West 125-150 KW. West. Ind.

75 KW. 75 v. West.—100 HP West. Ind.

50 KW. 125 v. G.E. E. 2200 v.

40 KW 250 v. West.—60 HP West. Ind.

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175 cu. ft. 100 lb. pres. Chic. Pneu. 9x8.
164 cu. ft. Chic. Pneu. Steam Type.

DC MOTORS

HP	Make	Voltage	Wdg.	Spd.	Type
300	G.E.	230	sh.	1750	IM
300	West.	230	sh.	450	IM
300	West.	230	sh.	600	CW
150	G.E.	230	sh.	600	ATI
125	West.	230	sh.	277	IM
100	G.E.	230	sh.	400	IM
100	Al. Ch.	230	sh.	600	IM
75	G.E.	230	sh.	575	ITC
75	G.E.	230	sh.	600	IM
75	West.	230	sh.	900	CS
50	Al. Ch.	230	sh.	1750	IM
50	G.E.	230	sh.	900	IM
50	West.	230	sh.	600	CW
50	G.E.	230	sh.	900	IK
35	G.E.	230	sh.	1200	KT
25	Cr. Wh.	230	sh.	600	IK
25	Cr. Wh.	230	sh.	860	IK
25	Cr. Wh.	230	sh.	600	W386
15	G.E.	230	sh.	1120	KT
15	L. A.	230	sh.	3600	W386
15	West.	230	sh.	1750	W386
10	West.	230	sh.	1150	CS
10	West.	230	sh.	1150	CS
5	West.	230	sh.	1150	CS
5	West.	230	sh.	1150	CS

AC MOTORS (3 ph. 60 cy.)

HP	Make	Wdg.	Spd.	Type
300	G.E.	230	sh.	1750
300	West.	230	sh.	450
300	West.	230	sh.	600
150	G.E.	230	sh.	600
125	West.	230	sh.	277
100	G.E.	230	sh.	400
100	Al. Ch.	230	sh.	600
75	G.E.	230	sh.	575
75	G.E.	230	sh.	600
75	West.	230	sh.	900
50	Al. Ch.	230	sh.	1750
50	G.E.	230	sh.	900
50	West.	230	sh.	600
35	G.E.	230	sh.	1200
25	Cr. Wh.	230	sh.	600
25	Cr. Wh.	230	sh.	860
25	Cr. Wh.	230	sh.	600
15	G.E.	230	sh.	1120
15	L. A.	230	sh.	3600
15	West.	230	sh.	1750
10	West.	230	sh.	1150
10	West.	230	sh.	1150
5	West.	230	sh.	1150
5	West.	230	sh.	1150

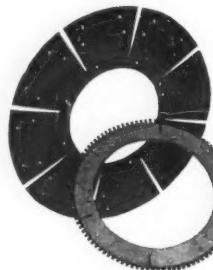
REDUCTION UNITS

500/700 HP Morse Chain Drive. 4.28 to 1.
300 HP V Belt dr. pulleys 30" and 48" sup-
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150 HP Nuttall 1.6 to 1.

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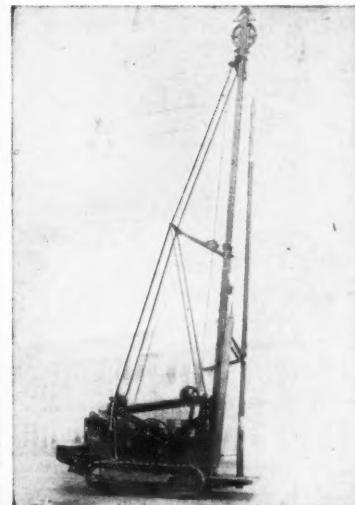
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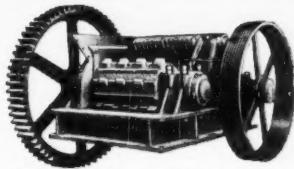
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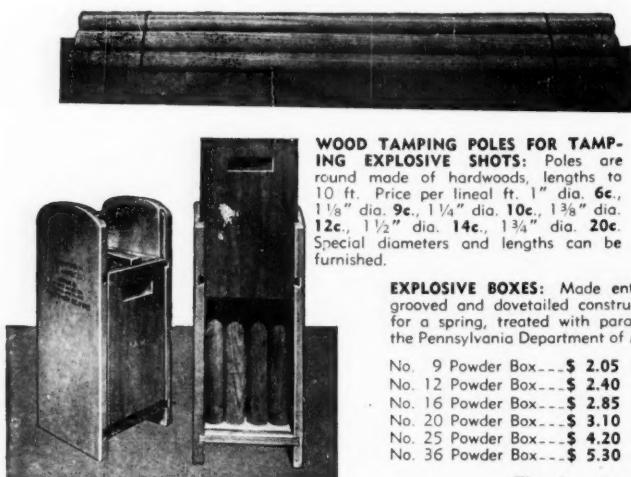
It's a viewpoint—a viewpoint, backed by expert knowledge and experience of determining for every application what type and construction of rubber will serve longest and for the lowest ultimate cost.

We know that for you to achieve minimum cost to the fullest extent, the selection of rubber products must be preceded by an analysis of the conditions and the development of proper specifications.

We call it "Job Engineering." It is yours without financial obligations or having to pay a premium, by simply requesting it, and it will work for you as it has for others.

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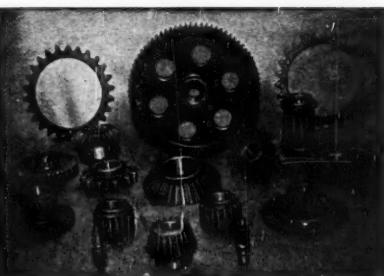
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No. 12 Powder Box--\$ 2.40	"	No. 72 Powder Box--\$ 7.50	"
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No. 20 Powder Box--\$ 3.10	"	No. 6 Cap Box--\$ 1.70	"
No. 25 Powder Box--\$ 4.20	"	Sizes 2 1/2" x 3" x 6" Inside	
No. 36 Powder Box--\$ 5.30	"	No. 8 Cap Box--\$ 1.70	"
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The above boxes are rigid and non-conductive.

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**Step up stripping speed...
cut overburden yardage costs
with Allis-Chalmers HD-19's**

W. G. Moore & Son use this Allis-Chalmers HD-19 Diesel Tractor, equipped with a Baker Hydraulic Bulldozer, to work around the dragline in stripping operations near Houtzdale. The HD-19 bunches overburden, cleans the face of the coal, builds drainage ditches and roads. This is the second HD-19 purchased by the Moore Company.

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On the Fiore Coal Co. job, near Pleasant Hill, these A-C tractors with bulldozers move overburden, push back the spoil bank and keep refuse from piling up.

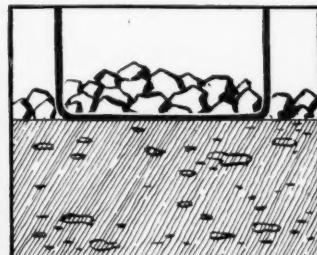


The new Model AD-4 Motor Grader is steadily winning favor among operators. It maintains roads, cuts, cleans and maintains ditches.

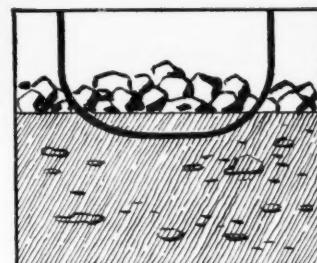
ESCO Coal Loading DIPPERS



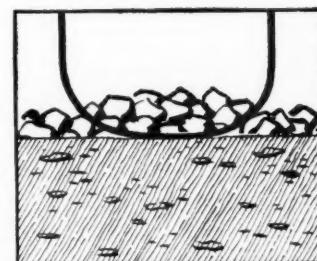
ESCO Coal Loading Dipper at Sunnyhill Coal Co., at New Lexington, Ohio.



Flat lip of ESCO coal loading dipper takes no dirt, cleans up coal.



Round lip takes dirt —



— or wastes coal.

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All fabricated bucket for loading shot coal. 1 to 10 yards.

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For general purpose work. $\frac{3}{8}$ to 15 yards.

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For extremely severe service. $\frac{3}{8}$ to 5 yards.

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"25% MORE FOOTAGE
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. . . for example, a
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feet in 12 minutes!"

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Kennametal "Solid Head" Bits are available in sizes from $3\frac{3}{4}$ " to 9". Write today for Catalog M-5 which gives full particulars on this and other Kennametal cutting and drilling tools.

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